

MEMORANDUM

400 CLIFTON AVENUE SOUTH

Date: February 11, 2003
 To: SUSTAINABILITY SUB-COMMITTEE
 From: Peter Vesterholt, AIA
 Comm. No: 2002045-07
 Re: **ROOF MAINTENANCE AND REPLACEMENT**

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COSTS

MINNEAPOLIS CENTRAL LIBRARY *APPENDIX A 2/11/03*

Minneapolis, Minnesota

ROOF MAINTENANCE COSTS

The following data has been gathered from Roofspec, Inc. a roofing and water proofing consultant, Rosenquist Construction, a roofing and waterproofing contractor, American Hydrotech, a waterproofing and green roof system supplier/manufacturer, and Mortenson/Thor:

1. Traditional Roofs (Built-up, or ballasted EPDM)
 - a. Basic roof maintenance program \$0.05/SF/Year
 For the library's flat roof area, this equates to $(67,700\text{SF} \times \$0.05=)$ \$3,385/Year
 The basic roof maintenance program includes visual inspection of the roof area, flashings, roof drains, and occasional repair of the roof. This type of annual maintenance program will support a 20-25 year service life for a built-up roof and a 10-15 year service life for an EPDM roof. A similar basic maintenance program on a green roof should support a 20-year service life for flashings and roof drains, and a 40-year service life for the roof membrane.
2. "Low maintenance" Extensive Green Roof (shallow soil depth)
 - a. Basic roof maintenance program (similar to 1.a, above) \$0.05/SF/Year b.
 Landscape maintenance by landscaping service company
 assuming 2-4 visits per year \$0.08-\$0.16/SF/Year
 For the library's flat roof area, this equates to $(67,700\text{SF} \times \$0.13-\$0.21=)$ \$8,800-\$14,200/Year
3. "High maintenance" Extensive Green Roof or Intensive Green Roof
 - a. Basic roof maintenance program (similar to 1.a, above) \$0.05/SF/Year b.
 Landscape maintenance by landscaping service company
 assuming 6-8 visits per year \$0.24-\$0.32/SF/Year

STATUS UPDATE

MINNEAPOLIS CENTRAL LIBRARY

Minneapolis, Minnesota

Page 2

For the library's flat roof area, this equates to (67,700SF x \$0.29-\$0.37=) \$19,600-\$25,000/Year
We would recommend that an irrigation system be installed for any green roof to aid in establishment of the plan materials and to mitigate potential occasional drought conditions. An irrigation system can be installed for \$0.50/SF or \$34,850 for the flat roof areas. The green roof budget ranges should be able to absorb the cost of an irrigation system.

ROOF MAINTENANCE AND REPLACEMENT COSTS

Following is a simple comparison of the current (present value) costs to replace and maintain the various roof systems under consideration for the 67,700 SF flat roof area of the new Minneapolis Central Library. The biggest unknown here is the estimated 40-year life span for the green roof systems. We have reason to assume that the green roofs will perform for 40 years, and perhaps longer, when installed correctly using the technology we would recommend for the library. However, there is no track history to substantiate the assumption.

System	Frequency	Unit Cost	Replacement Cost	40-Year Cost
A. Built-up Roof	Every 20 years	\$6.70/SF	\$435,600	\$907,200
Maintenance	Yearly	\$3,375/Yr	N/A	<u>\$135,000</u>
TOTAL 40-year costs				\$1,042,200
B. EPDM Roof	Every 10 years	\$6.70/SF	\$435,600	\$1,814,400
Maintenance	Yearly	\$3,375/Yr	N/A	<u>\$135,000</u>
TOTAL 40-year costs				\$1,949,400
C. Green Roof Flashing	Every 20 years	10% of Roof	\$121,900	N/A
D. Extensive Green Roof	Every 40 years	\$18-\$25.00/SF	\$1,218,600-\$1,692,500	
Total with interim flashing replacement (item C, above)				\$1,340,500-\$1,814,400
Maintenance	Yearly	\$8,800/Yr	N/A	<u>\$352,000</u>
TOTAL 40-year costs				\$1,692,500-\$2,166,400
E. Intensive Green Roof	Every 40 years	\$25-\$35.00/SF	\$1,692,500-\$2,369,500	
Total with interim flashing replacement (item C, above)				\$1,814,400-\$2,491,400
Maintenance	Yearly	\$19,600/Yr	N/A	<u>\$784,000</u>
TOTAL 40-year cost				\$2,598,400-\$3,275,400

STATUS UPDATE

MINNEAPOLIS CENTRAL LIBRARY

Minneapolis, Minnesota

Page 3

END OF MEMORANDUM